

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

9/13/07 JIANFENG CHEN et al

Serial No.: 10/707,048

9/13/07 Filed: November 17, 2003

For: ULTRAFINE MODIFIED ALUMINUM

HYDROXIDE AND ITS PREPARATION

:

: Confirmation No. 1047

: Group Art Unit 1714

: Examiner ANTHONY, Joseph David

DECLARATION UNDER 37 CFR 1.132

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

We, Jianfeng Chen, Fen Guo, Lei Liang, and Zhigang Shen, do hereby declare as follows:

1. We are joint-inventors of the subject matter described and claimed in the above-identified U.S. patent application 10/707,048.
2. We have read and are familiar with the specification filed in the US patent application 10/707,048, and with the Final Office Action in the present application issued on December 4, 2006.
3. We, individually or jointly conducted the following analyses, directly or by others working our instruction and supervision, regarding the oxalic-modified aluminum hydroxide that is claimed in US application 10/707,048, and component compounds thereof.
4. The **x-ray diffraction (XRD)** patterns of three kinds of aluminum hydroxide crystals were obtained from Materials Data, Inc.. The three types of crystals were gibbsite,

nordstrandite and bayerite. The XRD patterns for these three are shown in Exhibits IA, IB, and IC, attached.

5. Upon comparison with the XRD of the oxalic-modified aluminum hydroxide shown in Figure 1 of the present application, it is our opinion that the XRD of the oxalic-modified aluminum hydroxide is different from those of the three commercially available aluminum hydroxide crystals.

6. An XRD figure library was viewed, and an aluminum hydroxide crystal was not found that had a XRD pattern similar to that of the oxalic-modified aluminum hydroxide.

7. **Fourier Transform Infrared (FTIR)** spectra were obtained for the following standard compounds and compositions:

Compound/composition	Exhibit #	Carboxyl peak	Source
$C_2H_2O_4$ (anhyd. oxalic acid, mixed with paraffin)	IIA IIB (pg 2-A))	1730 1730	Handbook* Aldrich **
$C_2H_2O_4 \cdot 2H_2O$ (dihydrate oxalic)	IIC	1692	Spectral ***
$C_2H_2O_4 \cdot 2H_2O$ (dihydrate oxalic, mixed with paraffin)	IID	1685	Spectral ***
HCOOH (formic acid)	IIE	1722	Spectral ***
ATH (mixed with paraffin)	IIF	none	Spectral ***

Sources: * Handbook of analytical chemistry. The part III, spectrum analysis-The Second Edition

**** Aldrich Library of FT-IR Spectra**

***** Spectral Database for Organic Compounds**

8. It is well known that the IR pattern site of a carboxyl peak will change slightly under the influence of other groups in the compound or in the composition. The carboxyl peak for formic acid is 1722. Under the influence of a second carboxyl peak (in oxalic acid), the carboxyl peak is 1730 and further with water of hydration, the carboxyl peak shifts to 1692 (when mixed with KBr salt) and 1685 (in paraffin).

9. Figure 3 of the present application shows the FTIR for the oxalic-modified aluminum hydroxide, showing a peak at about 1713. Since the ATH (as one of the reactants) does not have a carboxyl peak, it is our conclusion that the peak at 1713 in the oxalic-modified aluminum hydroxide is caused by the presence of the other reactant, oxalic acid.

10. We also note that the FTIR for the oxalic-modified aluminum hydroxide illustrated in Figure 3 was measured using a Nicolet-210 FTIR (USA), and that the oxalic-modified aluminum hydroxide had been mixed with KBR and pressed into pellets before recording the spectra that became Figure 3.

11. Thermal Gravimetric Analysis (TGA, or TA for short) was performed on a mixture of analytical-grade oxalic acid (hydrated) and aluminum hydroxide (ATH) at a weight ratio of 1:1, resulting in the scan shown in Exhibit III. A model STA 499C from Netzsch Inc. (Germany) was used and operated at a heating rate of 10°C/minute in a nitrogen atmosphere.

12. Exhibit III shows that two peaks come off for oxalic acid; the first peak shows the loss of water of hydration at 115° C, and the second peak shows its decomposition at 202° C. There is also one peak for aluminum hydroxide as it decomposes at 302° C.

13. Upon comparison with the TA analysis of the oxalic-modified aluminum hydroxide shown in Figure 2, which shows only one peak at about 400° C, it is our opinion that

the oxalic-modified aluminum hydroxide is a single compound having a chemically bonded structure consisting aluminum hydroxide and the oxalic acid moiety, and it is not a physical or chemical mixture of the two components.

We further declare that all statements made of our knowledge are true and that all statements made on information and belief are believed to be true; further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 USC 1001 and may jeopardize the validity of the application or any patent issuing thereon.

2007. 04. 03.
Date

Jianfeng Chen (陈建峰)
Jianfeng Chen

2007. 04. 03.
Date

Fen Guo (郭奋)
Fen Guo

2007. 04. 03.
Date

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2007. 04. 03.
Date

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18 USC 1001: "Whoever in any matter within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals or covers up by any trick, scheme, or device a material fact, or makes any false, fictitious or fraudulent statements or representations, or makes or uses any false writing or document knowing the same to contain any false, fictitious or fraudulent statement or entry, shall be fined not more than \$10,000 or imprisoned not more than five years, or both."

EXHIBIT IA

PDF#33-0018: QM=Common(+), d=Diffractometer, I=(Unknown)

PDF Card

Gibbsite, syn

Al(OH)3

Radiation=CuKα1

Lambda=1.5406

Filter=

Calibration=

2θ=18.282-90.716

I/c(RIR)=1.0

Ref. Level-1 PDF

Monoclinic, P21/n(14)

Z=8

mp=

CELL: 8.6552 x 5.0722 x 9.7161 <90.0 x 94.607 x 90.0>

P.S=

Density(c)=2.4

Density(m)=

Mwt=

Vol=425.2

Ref: Ibid.

Strong Lines: 4 85/X 4.37/7 1.46/6 2.39/6 4.32/5 2.05/4 2.45/4 1.75/3

50 Lines, Wavelength to Compute Theta = 1.54056 Å (Cu), I%-Type = (Unknown)

#	d(Å)	h(k)	(h k l)	2-Theta	Theta	1/(2θ)	#	d(Å)	l(%)	(h k l)	2-Theta	Theta	1/(2θ)
1	4.8486	100.0	(0 0 2)	18.282	9.141	0.1031	26	1.6974	4.0	(1 2 4)	53.975	26.988	0.2946
2	4.3711	70.0	(1 1 0)	20.299	10.150	0.1144	27	1.6845	30.0	(3 1 4)	54.423	27.211	0.2988
3	4.3187	50.0	(2 0 0)	20.548	10.274	0.1158	28	1.6576	18.0	(1 3 0)	55.381	27.691	0.3016
4	3.3590	17.0	(2 0 2)	26.514	13.257	0.1489	29	1.5926	7.0	(4 1 4)	57.850	28.925	0.3140
5	3.3122	30.0	(1 1 2)	26.895	13.448	0.1510	30	1.5865	7.0	(3 1 5)	58.093	29.047	0.3152
6	3.1829	25.0	(1 1 2)	28.010	14.005	0.1571	31	1.5739	16.0	(5 0 3)	58.603	29.302	0.3177
7	3.1054	13.0	(1 0 3)	28.724	14.362	0.1610	32	1.5525	3.0	(2 0 6)	59.492	29.746	0.3221
8	2.4658	25.0	(3 1 1)	36.406	18.203	0.2028	33	1.4846	8.0	(2 1 6)	62.510	31.255	0.3368
9	2.4522	40.0	(0 2 1)	38.615	18.308	0.2039	34	1.4577	60.0	(3 2 4)	63.796	31.899	0.3430
10	2.4224	15.0	(0 0 4)	37.062	18.541	0.2064	35	1.4405	18.0	(4 1 5)	64.851	32.326	0.3471
11	2.3851	55.0	(3 1 1)	37.683	18.842	0.2096	36	1.4115	19.0	(3 3 2)	66.147	33.074	0.3542
12	2.3471	4.0	(1 2 1)	38.317	19.159	0.2130	37	1.4021	13.0	(3 1 6)	66.648	33.324	0.3566
13	2.2899	15.0	(3 1 2)	39.313	19.657	0.2184	38	1.3808	6.0	(3 3 2)	67.815	33.907	0.3621
14	2.2464	20.0	(0 2 2)	40.107	20.053	0.2226	39	1.3620	10.0	(0 2 6)	68.881	34.441	0.3671
15	2.1924	2.0	(1 2 2)	41.139	20.569	0.2281	40	1.3311	7.0	(1 2 6)	70.715	35.358	0.3758
16	2.1647	27.0	(3 1 2)	41.889	20.845	0.2310	41	1.3247	4.0	(2 2 6)	71.109	35.554	0.3774
17	2.0845	4.0	(1 1 4)	43.373	21.686	0.2399	42	1.2999	3.0	(4 1 6)	72.679	36.339	0.3846
18	2.0489	40.0	(3 1 3)	44.166	22.083	0.2440	43	1.2316	3.0	(6 2 2)	77.428	38.714	0.4060
19	2.0234	3.0	(2 2 2)	44.752	22.376	0.2471	44	1.2267	2.0	(3 3 4)	77.795	38.897	0.4076
20	1.9944	28.0	(0 2 3)	45.439	22.720	0.2507	45	1.2160	12.0	(4 2 5)	78.511	39.305	0.4112
21	1.9637	12.0	(1 2 3)	46.190	23.095	0.2548	46	1.2116	7.0	(1 4 2)	78.952	39.476	0.4127
22	1.9200	15.0	(1 2 3)	47.305	23.652	0.2604	47	1.1791	4.0	(1 1 8)	81.578	40.789	0.4241
23	1.8042	30.0	(3 2 2)	50.547	25.273	0.2771	48	1.1452	4.0	(6 2 4)	84.539	42.269	0.4366
24	1.7517	30.0	(0 2 4)	52.174	26.087	0.2854	49	1.0933	3.0	(4 4 0)	89.586	44.793	0.4573
25	1.7365	4.0	(1 2 4)	52.665	26.333	0.2879	50	1.0826	4.0	(6 3 2)	90.716	45.358	0.4619

Simulation Parameters: Fixed-Slit Intensities, Two-Theta Range = 18.28/92.72/0.01, FWHM = 0.1

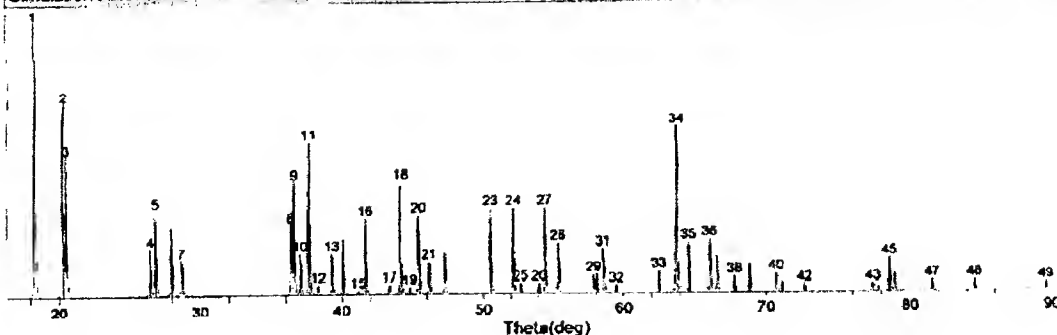


EXHIBIT IB

PDF24-8888: Q3=Common+; Q=Deuteractometer; J=Unknown PDF Camp

Nordstrandite, syn

Al(OH)3

Radiation=CuKα1

Lambda=1.5406

Filter=

Calibration=

2T=18.508-68.708

Vic(R/R)=

Ref. Level=1 PDF

Triclinic, P1(1)

Z=2

mp=

CELL: 5.082 x 5.127 x 4.98 <93.87 x 118.92 x 70.27>

P.S=

Density(c)=2.436

Density(m)=

Mwt=

Vol=106.1

Ref. Ibid.

Strong Lines: 4.78/3 2.27/3 2.02/3 4.32/3 2.39/3 1.90/2 4.21/2 1.78/1

48 Lines, Wavelength to Compute Theta = 1.54056 Å (Cu), 1% Type = (Unknown)

#	d(Å)	h	k	l	2-Theta	Theta	1/(2d)	#	d(Å)	h	k	l	2-Theta	Theta	1/(2d)
1	4.7800	100	0	(0 1 0)	18.508	9.254	0.1044	25	1.9020	20	0	(-2 1 1)	47.780	23.890	0.2629
2	4.3200	25	0	(0 0 1)	20.642	10.271	0.1157	26	1.8770	2	0	(0 -1 2)	48.457	24.229	0.2664
3	4.2100	18	0	(1 0 -1)	21.085	10.542	0.1188	27	1.8210	2	0	(-1 2 0)	50.048	25.024	0.2746
4	4.1600	12	0	(1 0 0)	21.341	10.671	0.1202	28	1.8040	4	0	(-2 -2 2)	50.553	25.276	0.2772
5	3.8900	12	0	(1 1 0)	22.842	11.421	0.1285	29	1.7840	14	0	(-1 -2 2)	51.160	25.580	0.2803
6	3.6100	8	0	(-1 -1 1)	24.640	12.320	0.1385	30	1.7150	2	0	(0 2 2)	53.377	26.689	0.2915
7	3.4300	6	0	(0 1 1)	25.955	12.978	0.1458	31	1.7040	2	0	(-2 1 0)	53.750	26.875	0.2934
8	3.0300	4	0	(0 -1 1)	29.454	14.727	0.1650	32	1.6680	4	0	(-1 2 2)	55.006	27.503	0.2996
9	2.8480	4	0	(-1 1 1)	31.384	15.692	0.1756	33	1.6530	4	0	(-3 -1 2)	55.549	27.774	0.3025
10	2.7100	2	0	(-1 1 0)	33.026	16.513	0.1845	34	1.6320	2	0	(-1 0 3)	56.326	28.163	0.3064
11	2.5010	2	0	(-2 -1 1)	35.876	17.938	0.1999	35	1.6180	2	0	(-2 0 3)	56.935	28.467	0.3094
12	2.4800	12	0	(1 1 1)	36.180	18.095	0.2016	36	1.5880	6	0	(-2 -1 3)	57.636	28.818	0.3129
13	2.4650	8	0	(1 0 1)	36.572	18.286	0.2037	37	1.5720	4	0	(-3 0 2)	58.681	29.341	0.3181
14	2.3930	25	0	(-2 0 1)	37.554	18.777	0.2089	38	1.5600	2	0	(0 3 1)	59.177	29.589	0.3205
15	2.3330	6	0	(-1 -2 1)	38.658	19.279	0.2143	39	1.5470	6	0	(-1 -1 3)	59.725	29.862	0.3232
16	2.2710	30	0	(-1 -1 2)	39.854	19.827	0.2202	40	1.5170	7	0	(0 -2 2)	61.030	30.515	0.3296
17	2.2170	4	0	(2 1 0)	40.662	20.331	0.2255	41	1.4790	6	0	(3 1 0)	62.773	31.387	0.3381
18	2.1460	4	0	(-1 1 2)	42.070	21.035	0.2330	42	1.4650	2	0	(-2 2 1)	63.443	31.721	0.3413
19	2.1130	2	0	(-2 -1 2)	42.759	21.379	0.2366	43	1.4410	14	0	(3 2 0)	64.626	32.313	0.3470
20	2.0740	4	0	(-2 -2 1)	43.804	21.902	0.2411	44	1.4300	5	0	(0 1 3)	65.185	32.592	0.3497
21	2.0160	25	0	(1 2 1)	44.928	22.463	0.2480	45	1.4040	3	0	(-3 0 3)	66.546	33.273	0.3561
22	1.9910	2	0	(0 -2 1)	45.621	22.761	0.2511	46	1.3880	2	0	(-1 3 1)	67.415	33.708	0.3602
23	1.9750	2	0	(1 -1 1)	45.911	22.855	0.2532	47	1.3700	1	0	(-3 1 2)	68.423	34.211	0.3650
24	1.9450	6	0	(2 2 0)	46.661	23.330	0.2571	48	1.3650	1	0	(0 3 2)	68.708	34.354	0.3663

Simulation Parameters: Fixed-Slit Intensities, Two-Theta Range = 18.51/70.71/0.02, FWHM = 0.1

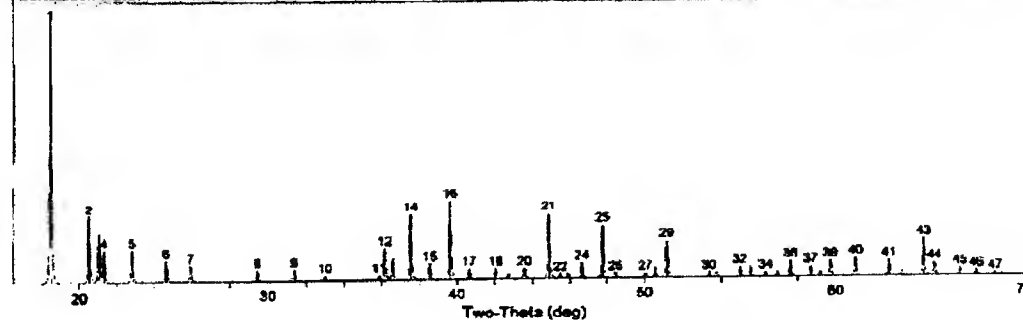


EXHIBIT IC

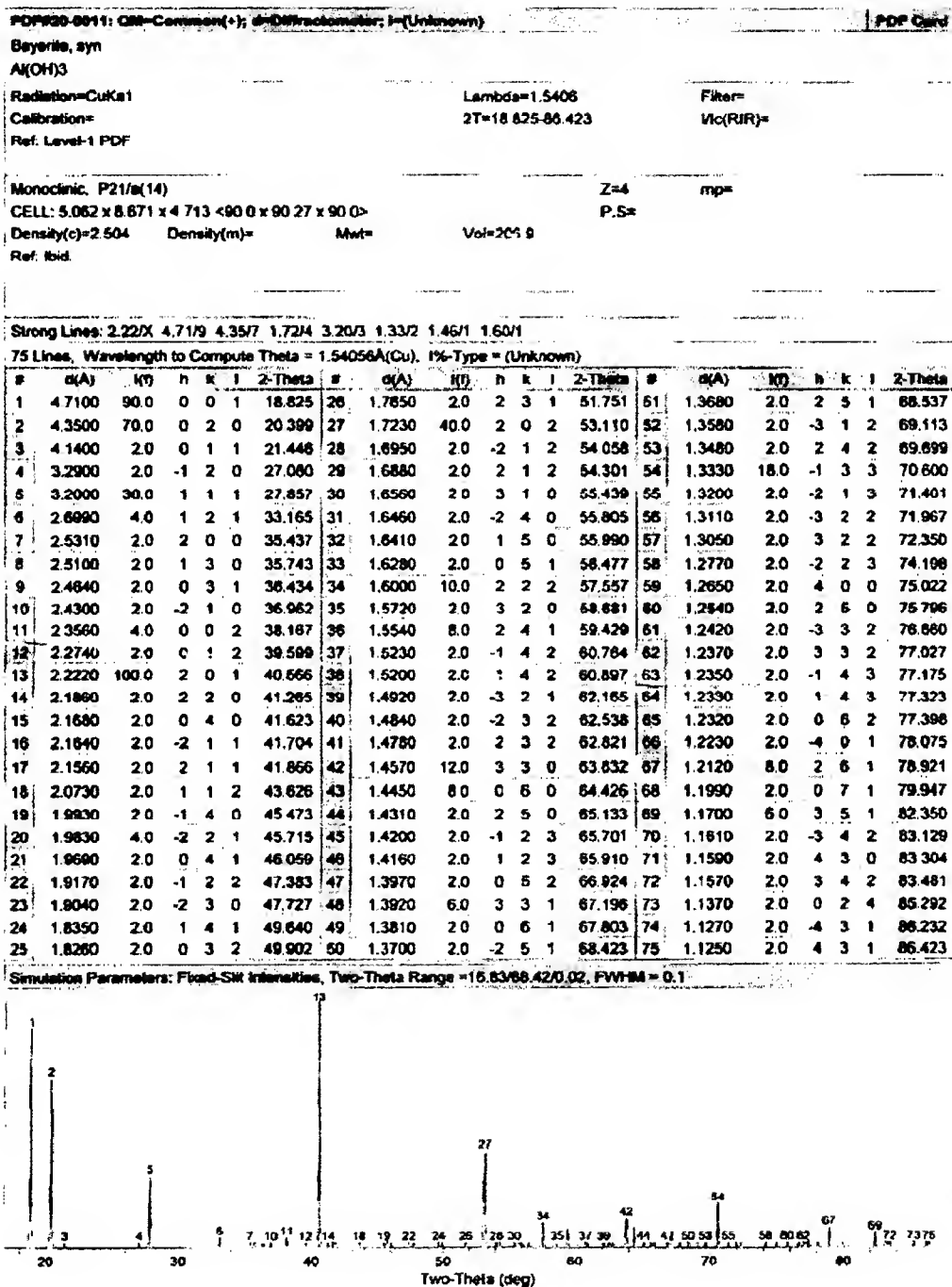


EXHIBIT IIA

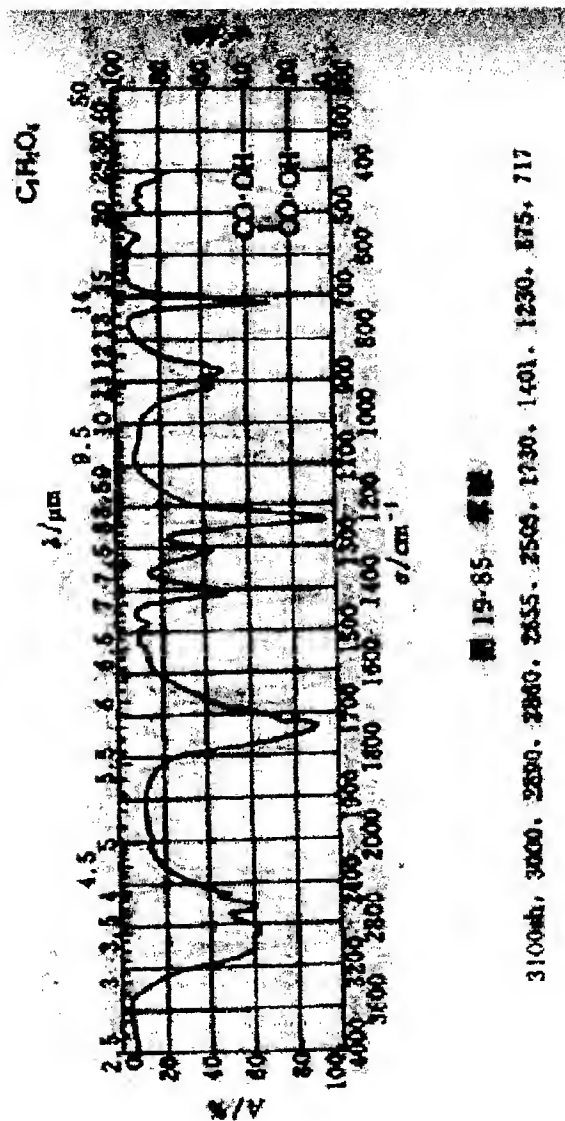


EXHIBIT IIB-1

THE ALDRICH LIBRARY
of
FT-IR SPECTRA

Edition I

Volume 1

CHARLES J. POUCHERT

EXHIBIT IIB-2

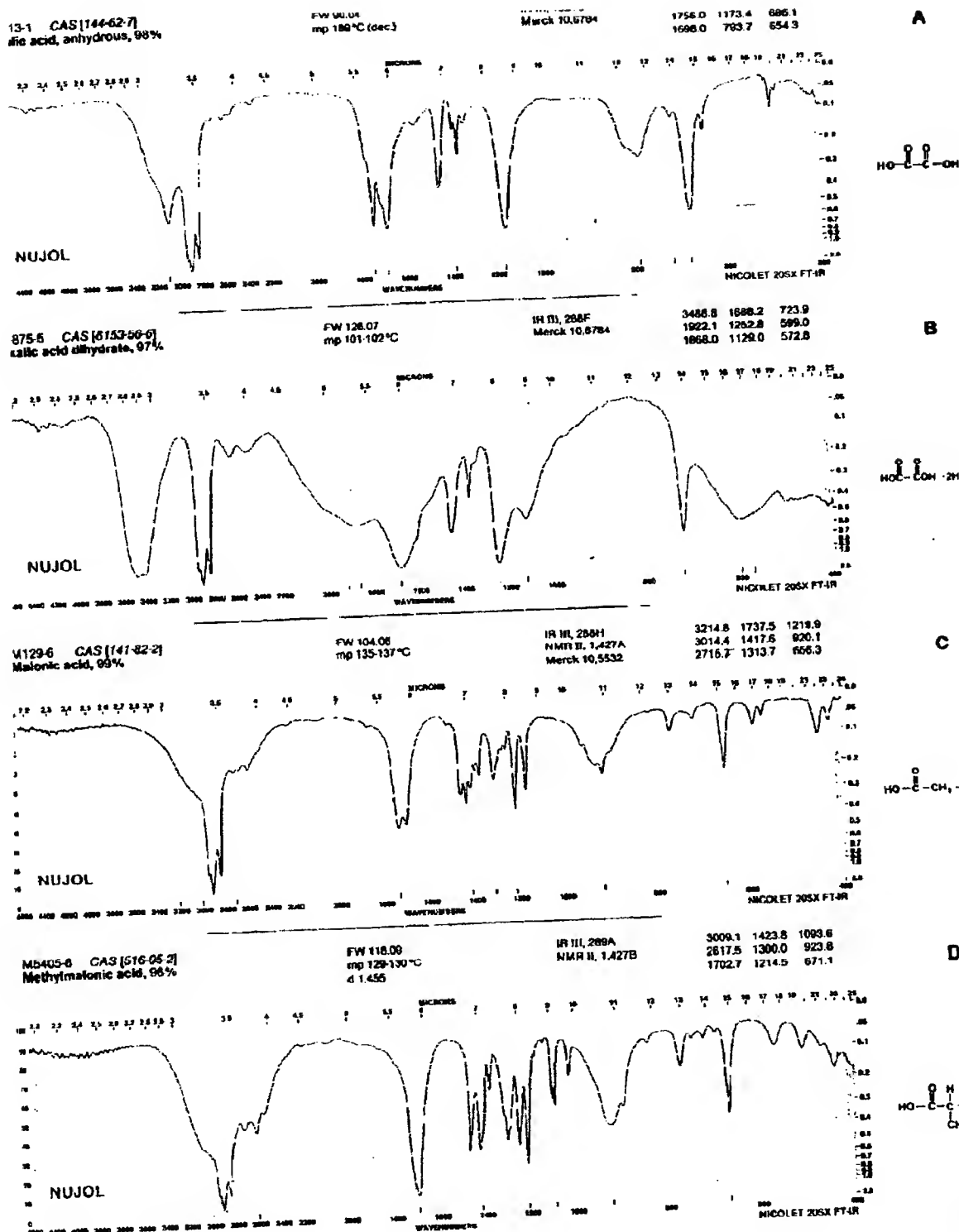


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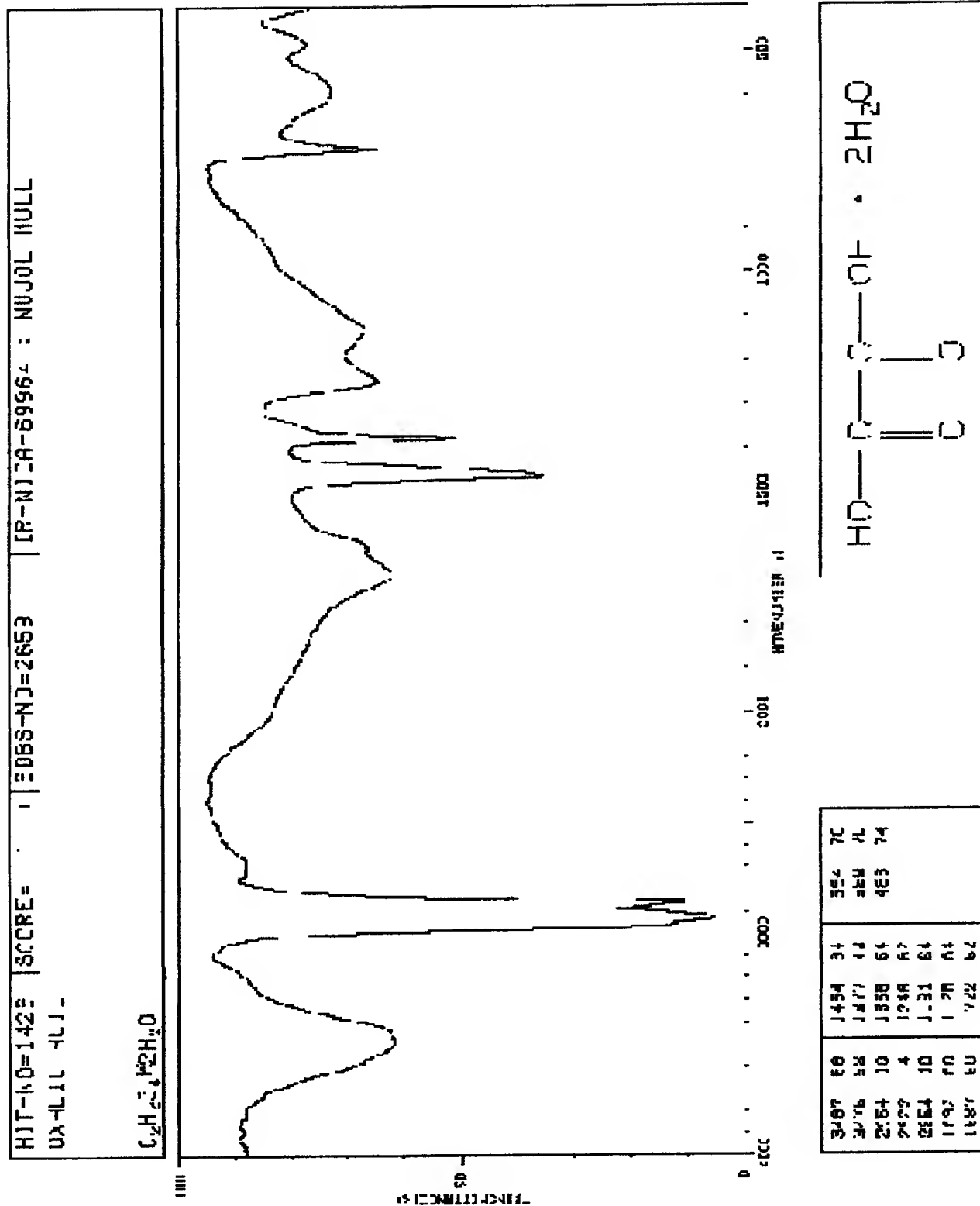


EXHIBIT IID

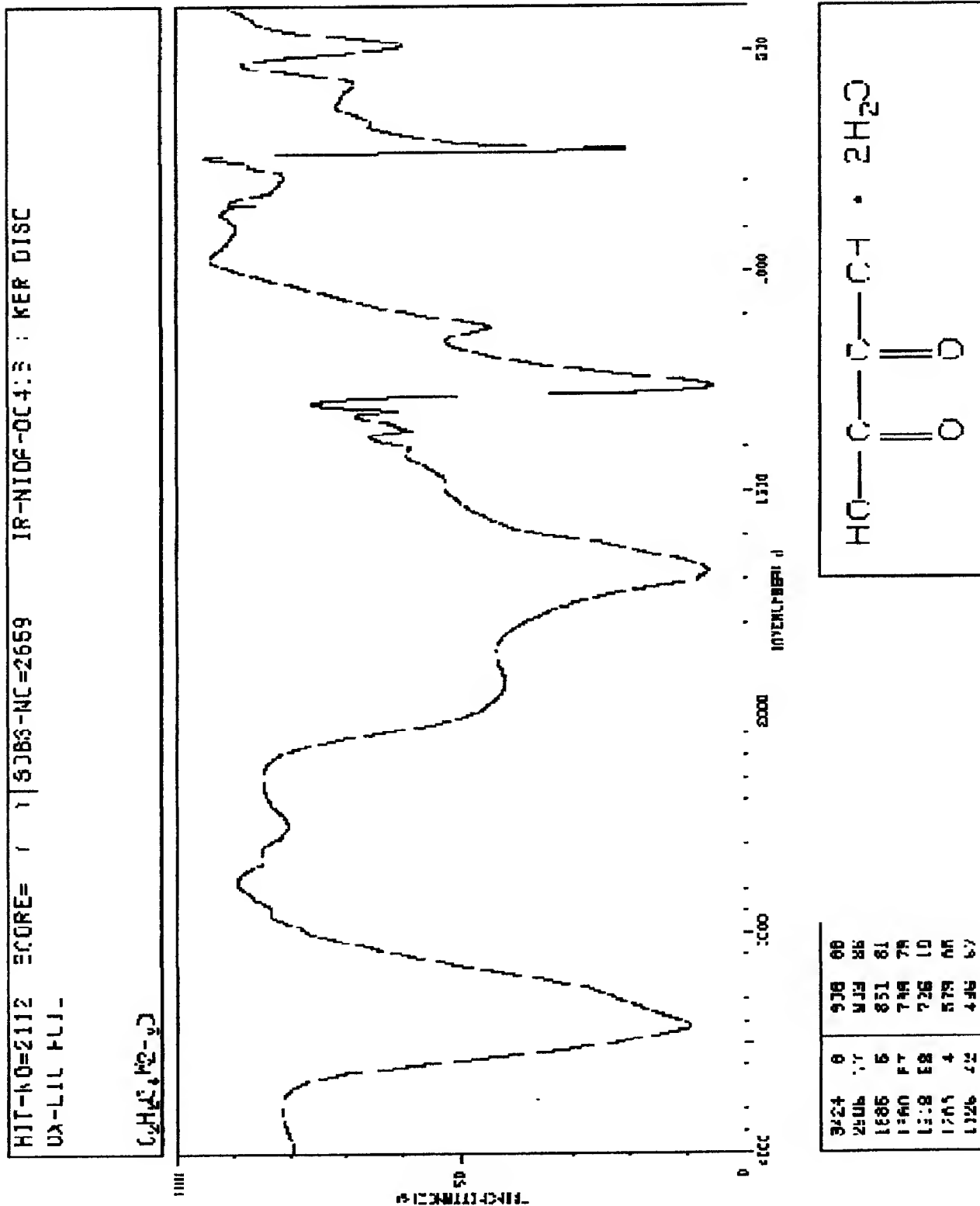


EXHIBIT IIE

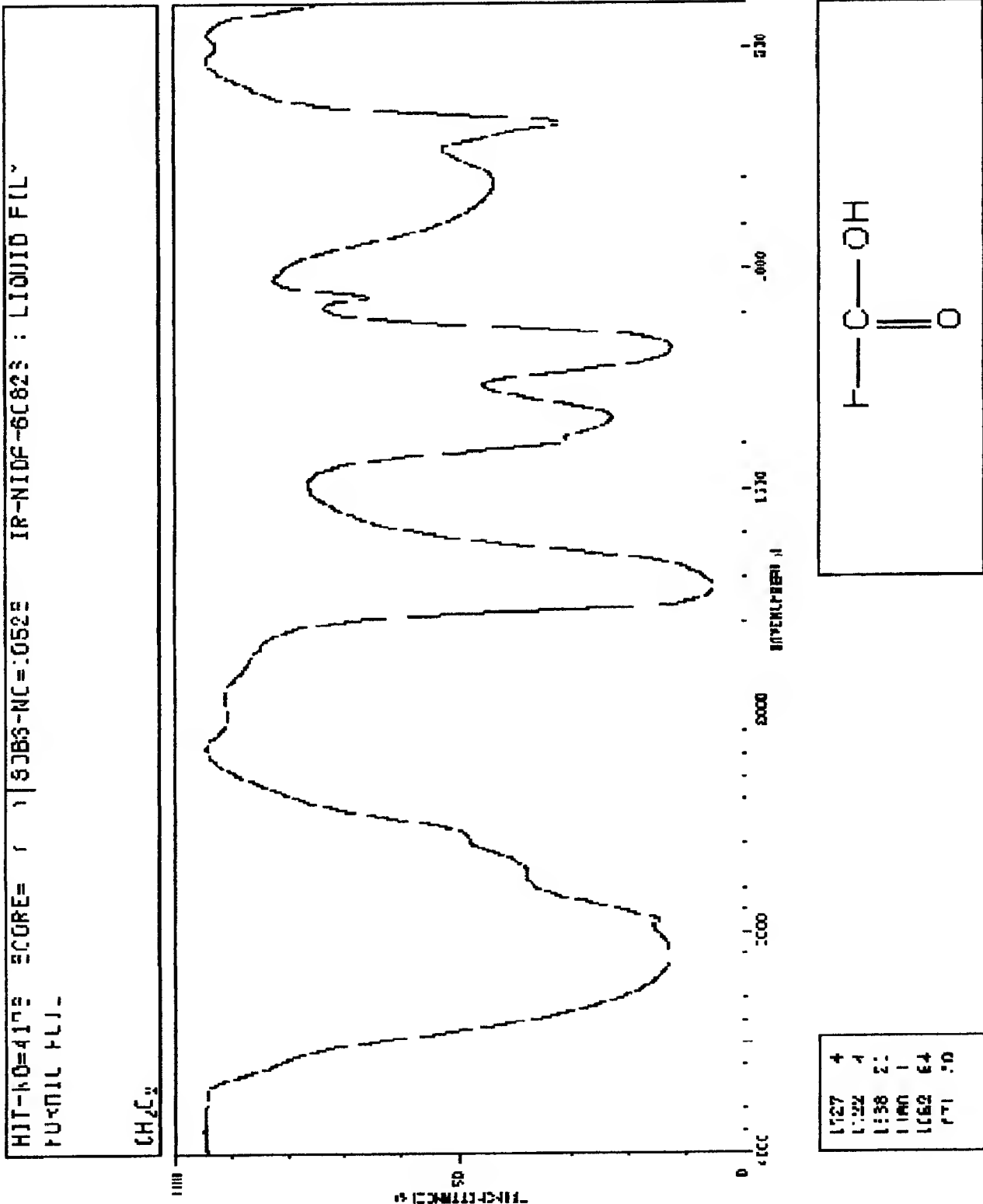


EXHIBIT IIF

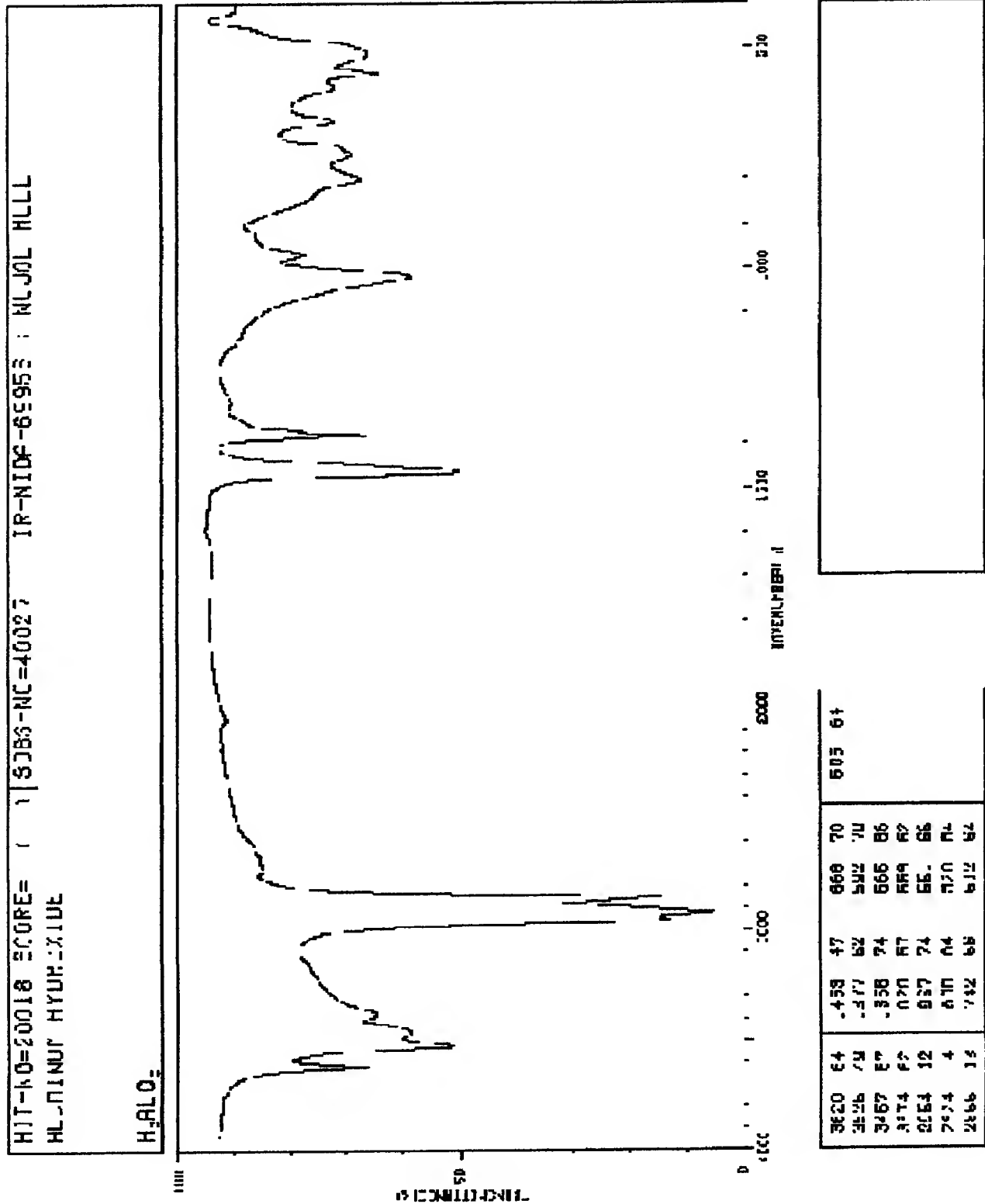


EXHIBIT III

